

The Effect of Limb Muscle Explosive Power Training on the Speed of the Results of Pencak Silat Kicks of PSHT Students

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Abstract: Internal problem study this is there any effect of leg muscle explosive power training on the speed of sickle kick results of Pencak Silat PSHT students at SMA Negeri 4 Sekayu. The purpose of this study was to determine whether or not there was an effect of leg muscle explosive power training on the speed of sickle kick results of Pencak Silat PSHT Students of SMA Negeri 4 Sekayu. The method used in this study uses the method Experiment Design That is pre- Experiment Design Often also called "Almost Experiment" or mock experiments. The type of design used one group pretest-posttest design. Data collection techniques with tests. Data analysis techniques using statistical analysis. Researchers use several method statistics, namely simple linear regression, product moment correlation, and testing the hypothesis used t test The conclusion shows the results of the regression $Y = 0.008 + 1.16 X$ the results of calculating the product moment correlation (r_{xy}) of 0.17 is included in the category of the level of a strong relationship between the independent variables and the variables bound, and the determinant coefficient (r^2) = 51% of the speed of sickle kick results and the rest is influenced by other factors. Also, through hypothesis testing, namely $t\text{-count} > t\text{-table}$ ($5.29 > 1.701$). clarifies that H_a is accepted and H_o rejected significantly. Thus, there is an effect of muscle explosive power training limbs on the speed of the sickle kick results of Pencak Silat PSHT students at SMA Negeri 4 Sekayu.

Keywords: Leg Muscle Explosive Power Training, Pencak Silat, Sickle Kick Result Speed

A. Introduction

Pencak Silat is a branch of martial arts that is widely known at the regional level (Southeast Asia and Asia) and has even developed at the international level. In the World Pencak Silat Championship, participants no longer only come from the Asian region, but are also envoys and representatives from countries on every continent. This indicates that Pencak Silat has given its own color in the development of sports globally. On the other hand, along with the development of Pencak Silat which is rooted in Indonesian culture, of course it really needs to be introduced to and learned by all levels of society, especially school students. Thus, the development of Pencak

Silat has become increasingly recognized, both as a competitive sport, as a national culture, and as one of the activities in physical education, so as to achieve a balanced physical and mental harmony for students. Pencak Silat is also included in the curriculum in schools, which has the goal, namely that students have knowledge and understanding of Pencak Silat sports, have the ability and skills to do Pencak Silat sports and be able to develop a sportsmanlike attitude and participate actively. The search for the right athlete seeds is in schools. Student at school is a very strategic target for coaching to increase sports achievement for the future. It is understandable that school-age children when seen in terms of physically it is still possible to grow even bigger, so that you can achieve optimally. In other words, it can be said that the school is a means to recruit athletes who can achieve the highest performance.

SMA Negeri 4 Sekayu is one of the school institutions located in Balai Agung, Musi Banyuasin District. The school has many activities outside of school hours intended to be able to increase student potential and achievement, one of these activities is Pencak Silat. Apart from being included in the compulsory curriculum, Pencak Silat is also included in the school's extracurricular activities, and is in great demand by students. In extracurricular training students are educated and trained to become prospective athletes who excel. To achieve this achievement many factors come into play. According to Sajoto (1995), that in order to achieve an optimal performance one must have four kinds of completeness which include: 1) Physical Development (Physical Build Up); 2) Technical Development (Technical Build Up); 3) Mental Development (Mental Build Up); and 4) Champion maturity.

Every human activity in sports always involves physical condition or excellent body condition. Physical condition is a unified whole of components that cannot be simply separated, both for improvement and maintenance. Furthermore, that physical condition is one precondition which is very necessary in efforts to increase the performance of an athlete, it can even be said as a necessity that cannot be postponed or negotiable (Sajoto, 1995). One element of physical condition that is needed by every athlete is: strength (Jujur, et al., 2022) Leg muscle power training is a means to improve kicking ability, in practice it should refer to the movement characteristics of Pencak Silat and the students being trained. In addition to power, components that affect physical conditions include speed, endurance, agility, flexibility, accuracy, balance and coordination. The various components of the physical condition mutually support each other, not only leg muscle power which is dominant in the achievement of Pencak Silat sports. However, speed also has an effect because speed is the ability to move with the fastest possible speed (Triono et al, 2022). Viewed from the motion system, speed is the basic mobility ability of the central nervous system and muscle apparatus to display movements at a certain speed. Speed is a combination of three elements, namely movement reaction time per unit time, speed over a distance.

There are various types of exercises to improve leg muscle power abilities including Plyometrics, Weight Training, Interval Training, Circuit Training. An effective training method for increasing leg muscle power is plyometric training. Plyometrics is a training method for developing muscle explosive power, an important component of most sports achievements or performance. Plyometric movements are designed to engage the hip and leg muscles, and are a combination of speed and power. Type inner movement Plyometric training is fast, strong, explosive and reactive. Therefore, plyometric training is an exercise that is very suitable for increasing explosive power.

In Pencak Silat, attack techniques include punches, elbows, kicks. Kicks in Pencak Silat consist of straight forward kicks, sickle kicks, back kicks. By rotation of the waist and encouragement of the hips to increase kick power. Crescent kick is a trajectory kick technique, its movement forms a semicircle line, this kick works similarly to a sickle, which is swung from the outside to the inside. This sickle kick is very difficult to learn, especially for beginners. To get accurate and maximum kick results, you need to get regular, programmed and continuous training. To improve the results of crescent kicks, researchers try to provide several forms of training for leg muscle explosive power, namely by training plyometrics. Based on this, the researcher is interested in conducting a study entitled "The effect of muscle explosive power training limbs on the speed of sickle kicks for Pencak Silat students of PSHT SMA Negeri 4 Sekayu".

The problem in this study was "Is there any effect of leg muscle explosive power training on the speed of sickle kick results of Pencak Silat PSHT students at SMA Negeri 4 Sekayu? So that the problems that have been studied do not deviate from the research, a limitation of the problem is given, namely: as variable independent (X) Explosive leg muscle training, as the defensive variable (Y) Sickle kick speed, and female student PSHT SMA Negeri 4 Sekayu as the subject.

The purpose of this study was to determine whether or not there was an effect of leg muscle explosive power training on the speed of sickle kick results of Pencak Silat PSHT Students of SMA Negeri 4 Sekayu. Pencak Silat is a standard term used to refer to a typical Indonesian martial art. Martial art itself contains two meanings of art and self-defense. Art refers to the beauty of movement, pattern of steps, attack-defense, even art in Pencak Silat is more specifically defined as the art of ibing Pencak Silat where the beauty of movement and steps is combined with the accompaniment of pencak drum music (nayaga). Art can also be interpreted as a technique; attack techniques, dodge techniques, parry, hit, and so on. This is where the difference between a Pencak Silat expert and an ordinary person lies in a fight where a person who masters Pencak Silat will face an opponent with patterned and measured movements.

While self-defense is the main element in silat, the essence of one's expertise in silat is in this self-defense. Defending oneself in silat, of course, uses techniques, rules and philosophy in silat that someone has. Pencak Silat that was born from the taste, will, and creation of our ancestors was greatly influenced by elements of culture and customs, that is why in Pencak Silat the content of method and philosophy is very thick that characterizes a local wisdom of the nation. As a special martial art full of local wisdom of ancestors, each region in Indonesia has its own term to call Pencak Silat as a martial art. In West Java it is known as amengan, ulin, maenpo. In Minang ilok, in Betawi they play punch, in Central Java, East Java pencak, in Makassar some say manca'. bemanek in East Kalimantan, and so on. In order to standardize the terms needed for international association, the standard term Pencak Silat was born.

Pencak Silat is one of the indigenous cultures of Indonesia. Pencak Silat warriors and experts believe that the Malay people created and used this martial art since prehistoric times. Because at that time humans had to face harsh nature for the purpose of surviving by fighting wild animals, in the end humans developed self-defense moves. With a variety of geographical and ethnological situations as well as the times experienced by the Indonesian nation, Pencak Silat is shaped by its circumstances. Now we are familiar with Pencak Silat with various forms and styles, but all have the same aspects. Pencak Silat is elements of the personality of the Indonesian nation that are derived from the results of hereditary cultivation. Until now there has been no manuscript or collection on the history of the Indonesian nation's self-defense which was compiled in a natural and accountable way and became a source for more orderly development. Only hereditary and personal or group background and defense history core self is spoken. The nature of closedness because it was shaped by the colonial era in the past is an obstacle to development where now we are demanding wider openness and mass discussion.

The basic technique of Pencak Silat is a planned, directed, coordinated and controlled movement, which has four aspects as a whole, namely the mental-spiritual aspect, the martial aspect, the sports aspect, and the arts and culture aspect. Thus, Pencak Silat is a sport that is quite complete to study because it has four aspects which form a unified whole and cannot be separated. In Pencak Silat competition there are techniques and category which contested among others:

1. The sparring category is one that features two fighters from different camps. Both confront each other using elements of defense and attack namely, dodging, hitting, attacking on target, and dropping opponents, using tactics and fighting techniques, endurance stamina and fighting spirit, using rules and patterns of steps that take advantage of a wealth of moves, to get the most points.
2. The singles category is a category of Pencak Silat competitions in which a fighter demonstrates his skills in a single kick in a correct, precise and steady manner, full of soul, with bare hands and armed.

3. The doubles category is a Pencak Silat competition featuring two fighters from the same camp demonstrating the skill and wealth of their Pencak Silat martial arts techniques. Attack and defense movements are displayed in a planned, effective, aesthetic, steady and logical manner in a series of regular sequences, both powerful and fast and in slow motion full of soul, with bare hands.

4. The team category is a Pencak Silat competition that features three martial artists from the same book demonstrating their skills in the standard jurus double correctly, precisely, steadily, full of inspiration and unanimity with empty hands.

Crescent kick is a kick technique whose trajectory of motion forms a semicircle line, or this kick works similarly to a sickle, which is swung from the outside to the inside. An attack that comes from the side, this crescent kick is easy for the opponent to catch. Anticipate In this situation, pull the lower leg immediately after the kick is executed. From a standing stance, lift your knees as high as the target. Rotate the waist following the direction of the kick trajectory and simultaneously followed by a prod of the lower leg, centered on the knee, Hariyadi (2002). Meanwhile, according to Lubis (2004), a crescent kick is a semi-circular trajectory kicked into, targeting all parts of the body with the soles of the feet. The goal is to kick in a semicircle into the target of all parts of the body, with the back soles of the feet or the soles of the feet. While its function is to produce kicks that can add points or numbers two and to hit the target to the opponent's body. Based on the description above, the researcher can conclude that the crescent kick is a semicircular trajectory kick into with the rotation of the waist following the direction of the kick trajectory and simultaneously followed by a prod of the lower leg centered on the knee.



Figure 1. Sickle kick movement

PSHT stands for "Faithful Brotherhood of the Heart of Terate", "Kecer", while his martial arts game was called "Djojo Gendilo". River and he had formed a martial arts association as a means of self-defense, plus he was a brave man, the Dutch East Indies Government began to worry, he would be able to form the strength of the Indonesian nation and oppose them. After leaving his job, he left to Tegal. In 1914, Ki Ngabehi Surodiwirjo returned to Surabaya and worked at the Kalimas Railway Office, and in 1915 he moved to the Madiun Railway workshop. Here he reactivated the Brotherhood that had been formed in Surabaya, namely "Sedulur Tunggal Ketjer", only his Pencak Silat is now called "Djojo Gendilo Tjipto Muljo". Whereas in 1917, these names were adjusted to the conditions of the times and changed to the name "Faithful Brotherhood of the Heart of Terate".

In an effort to improve sports performance can be achieved with practice. According to Harsono (1988) training is "a systematic process, repeated over and over again by increasing the amount of training or work load. Sujarwo (1993) what is meant by training is a systematic process that is repeated steadily by always providing an increase in training load. Based on the above description can conclude that training is a work process that is carried out systematically, repeatedly with periodic and continuous increases in load with a goal to increase sports achievements. Systematic is planning according to a schedule, according to a pattern and a certain system, methodically from young to difficult, regular practice from simple to complex. Repetitive means that movements that were previously difficult to do become easier, automatic and reflective in their implementation so as to save more energy. More days means every time periodically as soon as it is time to increase the load, so not every day.

Physical exercise is one element of overall sports training. With physical training that is planned, systematic, continuous, and with certain loads, the body's physiology can then change the level of physical fitness to a high level of fitness, so that it can support the performance of athletes in sports. Explosive power is the ability of a person's muscles or muscle groups to use the maximum force deployed in the shortest or shortest time. The explosive power ability of the leg muscles means the ability of the leg muscles to perform movements using maximum force in the shortest amount of time. For maximum strength work done in a short time this is reflected as inactivity jumping according to Bompa (1983), explosive power is the result of a combination of strength and speed in muscle contraction. Explosive power is one of the motion components that is very important for doing strenuous activities because it can determine how strong a person can hit, how far one can throw, how fast one can run and so on. Suharno (1985) suggests that explosive power is the ability of a muscle or group of muscles to overcome high-speed load resistance in a complete movement.

Explosive power is always needed in practice sport explosive. In Pencak Silat, this explosive powder is used to punch or kick. Also, to move part or all of the body from one place to another that is done suddenly. The quality of this explosive power is greatly influenced by strength and speed. According to Sajoto (1995), speed is a person's ability to carry out continuous movements in the same form and in the shortest possible time. Meanwhile, according to Harsono (1988), speed is the ability to perform similar movements successively in the shortest possible time or the ability to take a distance in the shortest possible time.

Speed in branches sport is a fundamental physical component so that speed is a determining factor in sports. Leg muscle speed has a very important role in success when we do kick. When we attack or when we avoid, we need jump speed, whereas to jump, we use leg muscles. This is confirmed by the opinion of Suharsono (1988)

who says speed does not only mean moving the whole body quickly but can also move the limbs in a short time. Speed depends on several factors that influence it, namely: Strength, reaction time and flexibility. According to Nossek (1982), speed in this case can be divided into three, namely:

1. Sprint speed

According to Suharsono (1978), sprint speed is defined as the ability of organism's athlete perform movements with timing in short to achieve the best possible results.

2. Reaction speed

According to Suharsono (1988), reaction speed is the speed of a person between giving a stimulus (stimulant) and the first movement.

3. Moving speed

According to Sajoto (1995), movement speed is a person's ability to carry out continuous movements in the same form in the shortest possible time.

Pate et al (1993), propose that ability and speed are determined by the following factors, type of muscle fibers, the distribution of fast-twitch muscle fibers (FT) and slow-twitch muscles (ST), Nerve-muscle coordination, biomechanical factors, such as skill, and muscle strength.

Speed in changing direction and moving feet quickly are the most important physical skills for a fighter. According to Sajoto (1995), speed is a person's ability to carry out continuous movements in the shortest possible time. According to Ismaryati (2008), speed is a movement per unit of time, the speed of traveling a distance. From several opinions about speed, it can be concluded that speed is a person's ability to move in the shortest possible time. Plyometrics are exercises or repetitions that aim to connect speed and strength movements to produce explosive movements, the term is used in repetitive jumping movements or reflex training to produce explosive reactions. According to Chu (1992), plyometrics is defined as exercises that enable a muscle to reach maximum strength, in as short a time as possible. This speed- strength ability is known power; the speed ability of this power is called power. Based on the description above, it can be concluded that plyometrics is an exercise that aims to link movement speed and strength to produce movement.

Some forms of plyometric exercises that can be used to increase the explosive power of the lower limbs, including: bounding, leaping, standing jumps, multiple hop and jump, skipping, and ricochet. The Lateral Jump Over Barrier is a vertical jump exercise but pushing sideways off the ground, bringing your knees up to jump sideways over the barrier. The movement begins by standing next to the barrier by jumping vertically but beside from the ground over the barrier landed on both feet and immediately jumped in the direction of the other over the barrier.



Figure 2. Lateral Jump Over Barrier plyometric exercise (Chu, 1992)

Hypothesis is a temporary statement or answer to the proposed research formulation. The hypothesis of this study is that there is an effect of leg muscle explosive power training on the speed of crescent kick results of Pencak Silat PSHT Students of SMA Negeri 4 Sekayu. The hypothesis testing criteria used are:

- Ho : There is no effect of muscle explosive power training on sickle kick speed results of Pencak Silat PSHT Students of SMA Negeri 4 Sekayu.
 Ha : There is an effect of muscle explosive power training on the results of sickle kick speed of of Pencak Silat PSHT Students of SMA Negeri 4 Sekayu.

As for criteria hypothesis testing, accept Ho if $t\text{-count} < t_{\text{subject}}(1-\alpha)$ and reject Ho if $t\text{-count} > t_{\text{table}}(1-\alpha)$, where $t(1-\alpha)$ is the t contained in the t distribution table with dk $N-2$ and probability $(1-\alpha)$ (Sudjana, 2002).

B. Methods

The method used in this research is the experimental method. According to Sugiyono (2011), "Experimental research method is a research method used to find the effect of certain treatments on others under controlled conditions. Subana (2009), "Experimental research is research that aims to look at causal relationships. This study uses the experimental design method, namely pre-experimental design, often also called "quasi experiment or mock experiments. Type Design used one group pretest-posttest design. Research to find out effectiveness a method of leg muscle explosive power training by first conducting a pretest on the research sample before being given treatment and then holding a posttest described as follows:

Table 1. Experiment Group

Group	Pretest	Treatment	Posttest
Experiment	T_1	X	T_2

C. Results and Discussion

After the research was carried out, data was obtained in the form of a leg muscle explosive power test. The data collected consisted of pre-test data and post-test data. The data were then grouped and analyzed statistically.

Data Source TU of SMA Negeri 4 Sekayu

From the table above, it can be seen that the sample was taken from male students of the Jambon belt, totaling 30 students. From a sample of 30 students, an initial test (pretest) was carried out and then given treatment in the form of lateral Jump Over Barrier exercises for 5 weeks with a frequency of exercise 3 times a week with an intensity of 45 - 85% then done the final test (posttest) of the study was conducted for 5 weeks, from May 22 to June 22.

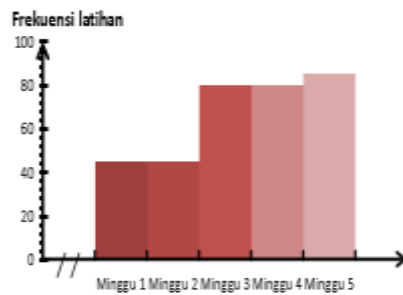


Figure 3. Histogram of Increases in Exercise Intensity

Description Data on Crescent Kick Pretest Results for 10 Seconds

Data from the measurement results of the crescent kick pretest can be seen in the table following and measurement show mean 19,13:

Table 2. Measurement Result of Crescent Kick

Category	Daughter	Son	Amount
Very well	> 24	> 25	-
Good	19 - 23	20-24	11
Enough	16 - 18	17-19	15
Less	13 - 15	16-16	4
Less than once	<12	<14	-

From the initial test results (Pretest) crescent kicks for 10 seconds from the table above are described in chart following:

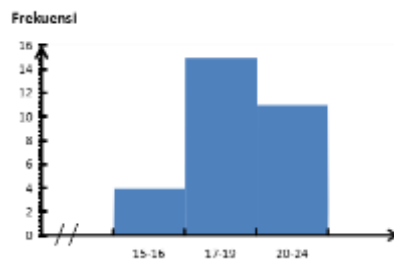


Figure 4. Frequency Histogram Pretest

Based on the picture above, it can be seen that the results of sickle kicks of students who reached 15-16 kicks were 4 students, 17-19 kicks were 15 students, 11 students were 20-24 kicks.

Description Data on Sickle Kick Posttest Results for 10 Seconds

Data from the measurement results of the sickle kick final test (Posttest) can be seen on the table following and measurement show mean 20,66:

Table 3. Measurement Result of Sickle Kick

Category	Daughter	Son	Amount
Very well	> 24	> 25	-
Good	19 - 23	20-24	20
Enough	16 - 18	17-19	10
Less	13 - 15	16-16	-
Less than once	<12	<14	-

Data on the results of the final test (posttest) sickle kick for 10 seconds and the data table is described in chart following:

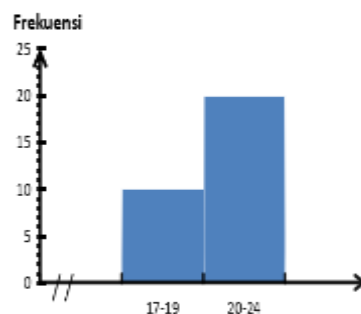


Figure 5. Frequency Histogram Pretest

Based on the picture above, it can be seen that the results of the sickle kick of students who reached 17-19 kicks were 10 students, 20 students were kicked 20-24 times.

The data obtained from the Pencak Silat sickle kick test for 10 seconds on the green belt PSHT Pencak Silat students' needs to be analyzed statistical data. In analyzing statistical data, researchers used several statistical methods, namely simple linear regression, product moment correlation, and tested the hypothesis using the t test Analysis through simple linear regression is calculated by looking for the regression equation. So, regression equation obtained that is:

$$\hat{y} = a + bX$$

$$= 0,008 + 1.16X$$

Based on the regression equation that has been obtained, it is known that the value of b is the regression coefficient with positive, namely 1.16. The results of this positive

value indicate that it is predicted that there is an effect of leg muscle explosive power training on the speed of sickle kick results. The next analysis is to use product moment correlation, this analysis is used to see the magnitude of the effect of the training effect one Explosive leg muscles against the speed of sickle kick results. So, the product moment correlation coefficient above is 0.71 with a strong category level relationship (between the independent variables and the dependent variable). Thus, to determine the magnitude of the influence or contribution of the application of variable X to variable Y can be calculated as follows $r^2 \times 100\% = (0.71)^2 \times 100\% = 50.41\%$ rounded to 51%.

From these results it can be concluded that the magnitude of the effect (contribution) of leg muscle explosive power training (independent variable) on the crescent kick result speed (dependent variable) is 51%. As determined above based on simple linear regression analysis shows (predicted to be) the influence of the use of leg muscle explosive power training on the speed of sickle kick results. Also, analysis through product moment correlation shows magnitude the influence or contribution of the independent variable to the dependent variable is 51%, then through hypothesis testing it can be seen whether what is generated is significant or not with the provisions of the hypothesis testing criteria. In conducting hypothesis testing, the t-test formula is used which is calculated as follows:

$$\begin{aligned}t\text{-count} &= \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} \\t\text{-count} &= \frac{0.71\sqrt{30-2}}{\sqrt{1-(0.71)^2}} \\t\text{-count} &= \frac{0.71\sqrt{28}}{\sqrt{1-0.5041}} \\t\text{-count} &= \frac{0.71(5.29)}{0.71} \\t\text{-count} &= \frac{37559}{0.71} \\t\text{-count} &= 5,29\end{aligned}$$

Thus, based on the criteria of the hypothesis in this study, namely:

H₀ : There is no effect of leg muscle explosive power training on the speed of sickle kick results Student Pencak Silat PSHT Palembang.

H_a : There is an effect of leg muscle explosive power training on hash speed sickle kick Pencak Students martial arts PSHT Palembang

With the level $\alpha = 0.05$ and $dk = n - 2$ then $30 - 2 = 28$. while for t-table can be seen in the attached value distribution t then obtained t-table =1.701 (in the appendix of the distribution of values t). From the data above it can be concluded that the hypothesis H_a can be accepted or $t\text{-count} > t\text{-table}$ ($5.29 > 1.701$). Thus, there is an effect of leg muscle explosive power training on the speed of the sickle kick results of of Pencak

Silat PSHT Students of SMA Negeri 4 Sekayu. This study aims to determine the effect of leg muscle explosive power training on the speed of sickle kick results student PSHT SMA Negeri 4 Sekayu. Through this exercise it is hoped that it can improve students' sickle kick skills, so that they motivate students to practice more and the results of their abilities increase as well.

Data collection is in the form of a test. To collect data on the results of students' abilities, researchers used tests. The test is carried out at the beginning and end of the meeting or the third or last meeting when finished doing leg muscle explosive power exercises. From the results of the pretest ranking, namely 30 sample students. Samples were given power training treatment explode leg muscles in the form of lateral jump over barrier exercises. The results of the sample pretest showed that the highest sickle kick was 21 times the sickle kick and sickle kick the lowest 16 kicks. After given training for 5 weeks then the sample is based on the results posttest experience the highest increase in kicks was 23 kicks and the lowest kicks were 17 kicks. The results above are also shown by calculating the prediction of a simple linear regression equation, namely $Y = a + bx$, where the results this calculations $Y = 0.008 + 1.16 X$. From the equation obtained, the value of b is positive, so that the coefficient has the effect of using leg muscle explosive power training to the speed of the sickle kick results of Pencak Silat (Haryadi, 2002).

Based on statistical evidence, the effect of leg muscle explosive power training to the speed of the results of the Pencak Silat sickle kick can be seen in the product moment correlation calculation results (r_{xy}) of 0.71 is included in the category of the level of a strong relationship between the independent variable and the dependent variable, and the determinant coefficient (r^2) = 51%. Thus, the result of leg muscle explosive power training contributes 51% to the speed of sickle kick results and the rest is influenced by other factors. Also, through hypothesis testing, namely $t\text{-count} > t\text{-table}$ ($5.29 > 1.701$), making it clear that H_a is accepted and H_o is rejected significantly.

D. Conclusion

Based on the research results and the results of data processing that has been done, it turns out that the proposed hypothesis can be accepted, thus it can be obtained conclusion that there is a significant difference between leg muscle explosive power training and the speed of sickle kicks in Pencak Silat PSHT students at SMA Negeri 4 Sekayu.

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